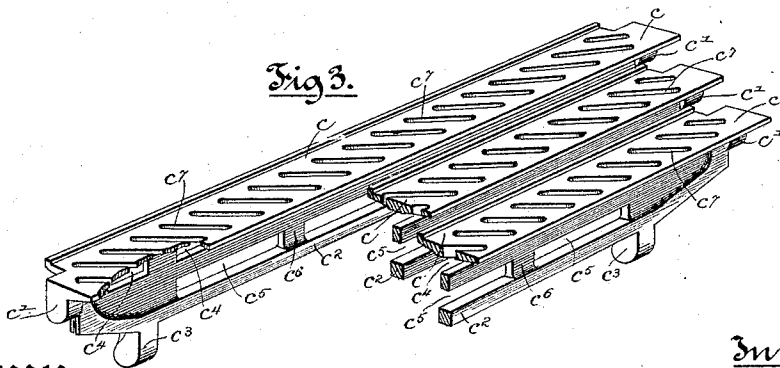
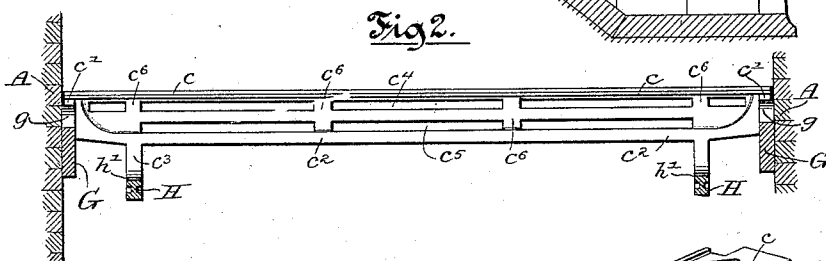
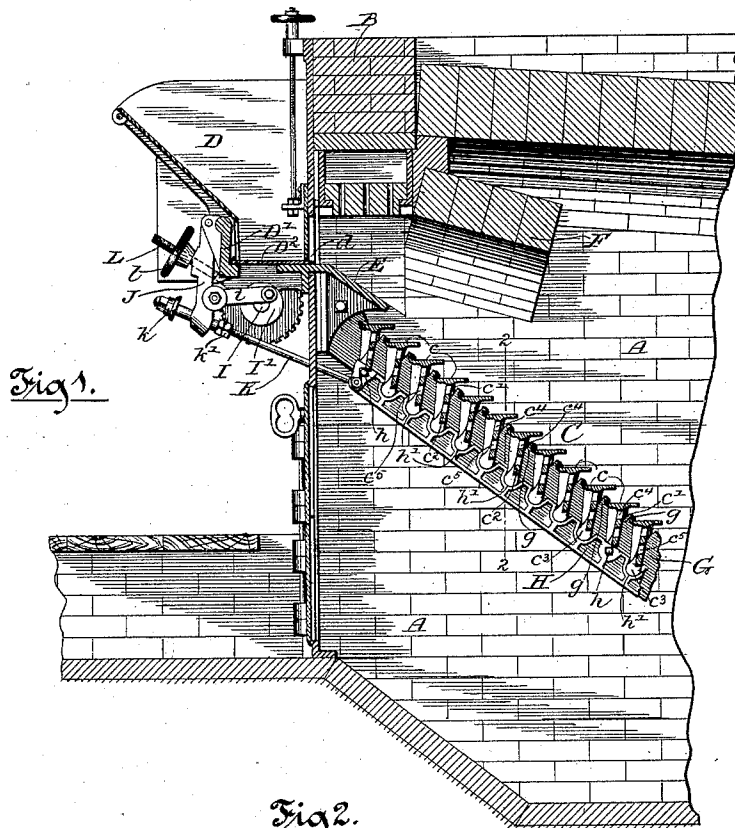


(No Model.)

W. R. RONEY & J. T. ARNOLD.
GRATE.

No. 474,345.

Patented May 3, 1892.



Witnesses
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UNITED STATES PATENT OFFICE.

WILLIAM R. RONEY AND JOHN T. ARNOLD, OF CHICAGO, ILLINOIS.

GRATE.

SPECIFICATION forming part of Letters Patent No. 474,345, dated May 3, 1892.

Application filed June 23, 1890. Renewed February 23, 1892. Serial No. 422,352. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM R. RONEY and JOHN T. ARNOLD, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Grates; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to furnace-grates, and more especially to that class of inclined grates consisting of a series of horizontal transversely-arranged grate-bars having flat-top surfaces to receive the fuel and depending webs or flanges, giving stiffness to the bars—such, for instance, as are shown in a prior patent, No. 409,304, granted to W. R. Roney August 20, 1889.

The present invention embraces an improved construction in grates of the character referred to, by which the depending flanges of the bars are provided with longitudinal slots arranged opposite or in line with the horizontal openings or spaces between the bars, so that a "slicing-bar" or other suitable implement may be inserted from the front of the grate through said slots and between the grate-bars for the purpose of stoking or stirring the mass of coal upon the grate.

The grate-bars shown in said prior patent, No. 409,304, are rocking grate-bars, and automatic feed devices are shown in said patent for continually moving or actuating the same, so as to produce a practically continuous feed of the fuel downwardly along the inclined surface of the grate. A grate provided with bars, made as herein set forth, may be employed to advantage in a grate provided with such actuating devices for the bars, inasmuch as it may often be found desirable to reach the fuel with a slicing-bar or other tool to break up or loosen the clinkers or masses of the latter which accumulate on the grate, even when a rocking motion is given to the grate-bars to feed the fuel along the surface of the same. A grate embracing the present improvement may, however, be used with advantage when the grate-bars are stationary or non-rocking and no automatic feed device is employed, it obviously being practicable, especially in the

case of small grates, to properly feed the fuel downwardly along or over the inclined grate-bars by agitating the fuel by the use of a hand-tool inserted through the slots or openings in the depending flanges of the bars. A further additional advantage gained by the employment of the slots or openings in the webs or flanges of the grate-bars is that such openings afford a more direct and abundant supply of air to the fuel resting on the grate, and thereby greatly facilitate combustion.

In the accompanying drawings, illustrating our invention, Figure 1 is a central vertical section of the upper part of a furnace-grate constructed in accordance with our invention. Fig. 2 is a detail cross-section of the same, taken upon line 2 2 of Fig. 1. Fig. 3 is a detail perspective view of three adjacent grate-bars, a portion of the same being broken away to more clearly illustrate the construction thereof.

As shown in the said drawings, A A are the side walls of the furnace, and B B are the front walls thereof.

C indicates as a whole an inclined grate arranged in the front part of the furnace, and D an external hopper or magazine situated in a position for the delivery of its contents upon the upper end of the inclined grate C through a passage *d* in the front wall B of the fire-box.

E is an angular plate situated at the bottom of the passage *d* and extending over the uppermost bar of the grate C.

F is a fire-brick hood or arch overhanging the upper portion of the grate C.

The grate C is composed of a series of transverse horizontally-arranged grate-bars *c*, having at their ends bearings *c'*, which rest in notches *g* in the upper edges of stationary inclined supporting-bars G G, located at the opposite sides of the furnace. The upper surfaces of the grate-bars *c* are flat and the edges thereof are continuous or non-fingered. Said bars are arranged in a stepped and overlapping position, so that the rear edge of one bar projects over the edge of a sub-adjacent bar, sufficient vertical spaces being provided between the overlapping edges to allow the proper influx of air and to give a desired inclination to the grate as a whole. The several grate-bars are provided with depending webs or flanges *c² c²* for giving the necessary

strength or stiffness to the bars, which flanges are slotted or apertured, as hereinafter more fully set forth. The said grate-bars c , when arranged to rock as shown, are provided with depending arms c^3 , which are engaged with a reciprocating rod or bar H, by the endwise motion of which the grate-bars may be rocked in their bearings on their supporting-bars G G. In the instance illustrated the upper and lower grate-bars are pivoted to the bar H, as seen at h , while the arms c^3 of the intermediate grate-bars merely engage the notches h' in the said bar. The rocking movement of the grate-bars is adjusted to bring the upper faces thereof at one extremity of their movement into a substantially-horizontal position and at the opposite extremity of their throw into an inclined position, so that when the actuating-bar H is reciprocated the coal or screenings or other fuel placed upon the inclined grate will be intermittently carried along or down the same in the progress of its combustion, as fully set forth in said prior patent hereinbefore referred to.

Devices are herein shown for feeding the fuel to the top of the grate and for giving a rocking movement to the grate-bars substantially like those shown in said prior patent, said parts being made as follows: The lower part of the magazine or hopper D is provided with an inwardly and outwardly movable front piece, follower, or pusher D', hinged at its end to the hopper and having attached to its lower edge a horizontal bottom plate D², which shares the inward and outward movement of the pusher. These parts operate in the same manner as described in said prior patent to force the fuel from the bottom of hopper inwardly upon the inclined grate at each advanced movement of the pusher.

I is a horizontal rotating shaft mounted beneath the hopper and provided with a crank-disk I'. Said crank-disk is connected by a rod i with a vibrating vertical arm J, which is pivoted at its upper end on the pusher D', and is connected at its lower end with the bar H by means of a connecting-rod K, said connecting-rod passing through a slot in the lower end of the arm J and being provided with nuts k on the opposite sides of the arm to allow of lost motion between the grate-bars and their actuating devices and to provide adjustment of the throw of the grate-bars. A screw L is secured to the pusher D', passes through a slot or opening in the said arm J, and is provided with a hand-wheel l , the hub of which bears against the outer surface of the arm. A lug or projection on the lower end of the pusher bears against the inner surface of said arm J, and these parts are so arranged that the pusher moves with the arm when the latter is vibrated, the hand-wheel l affording a means of adjusting the extent to which said pusher is moved.

The web or flange c^2 of each grate-bar c is provided in its upper part with a longitudinal slot or opening c^4 , arranged opposite the

space between the grate-bar and the next adjacent grate-bar below the same. Said flange c^2 is also provided in its lower part with a second longitudinal slot or opening c^5 , which is arranged in line with or opposite the upper opening c^4 of the next adjacent grate-bar. From this arrangement of the slots or openings in the webs it is obvious that, notwithstanding the fact that the web of each grate-bar extends downwardly past the grate-bars below the same, horizontal openings are provided, extending inwardly from the front of the grate and through which the fuel resting on the grate may be reached from the front of the same by means of a slicing-bar or poker. In the case of the rocking grate-bars shown the slots or openings c^4 c^5 are made wide enough to permit the stoking of the fire between the grate-bars when the bars are horizontal as well as when they are inclined. Inasmuch as the webs or flanges c^2 c^2 of the grate-bars are employed solely for the purpose of giving stiffness or strength to the bars, the slots or openings c^4 c^5 are not extended the entire length of the bars, but intermediate upright or transverse pieces c^6 c^6 are employed, connecting the bars with the lower longitudinal part of the web, as clearly shown in Fig. 2, so that the slotted or longitudinally-apertured web or flange of the bar constitutes in effect a truss, giving stiffness to the same. It will of course be understood that the number of slots or openings employed will depend upon the vertical depth of the webs—as, for instance, in the use of very long bars, the webs may need to be made so deep for giving the requisite strength as to require three or more slots or openings. As shown in the drawings, the webs are of such vertical depth as to extend past two adjacent grate-bars below the one to which the web belongs, so that two slots are employed to afford access to the spaces between the adjacent grate-bars. Under other circumstances, however, the web may be arranged to overlap only one bar or more than two bars, in which case the number of longitudinal slots will be correspondingly increased or decreased. Furthermore, in the case of a web or flange which extends past or below two or more adjacent bars, the said web or flange may be of skeleton form or provided with a single opening, through which access may be had to the spaces between the two or more adjacent bars, the lower part or member of the skeleton web or flange in that case corresponding with the lower horizontal member of the truss in a trussed bar or beam. The flat grate-bars may obviously be trussed or stiffened by means of a longitudinal tie rod or bar, made separate from the bar proper, of either cast or wrought metal and connected by suitable struts or posts with the central part of the bar, instead of being made integral with the bar, as shown. In such case the tie-rod will of course be so located as to admit of free access to the spaces between the grate-bars from the front of the grate, in the

manner and for the purpose hereinbefore set forth.

The employment of the slots or openings c^4 c^5 has the advantage not only of affording access to the fuel on the grate from the front of the same, but admits of a better supply of air to support combustion, it being obvious that the air may much more freely approach the spaces between the overlapping parts of the grate-bars through such openings than is possible in the use of continuous or non-perforated webs, such as are shown in the grate illustrated in said prior patent, No. 409,304.

The slots or openings in the flanges of the grate-bars have the advantage of enabling the mass of burning fuel on the grate to be reached by the attendant from the front of the grate by means of a slicing-bar or other hand implement, so that clinker adhering to the grate-bars may be dislodged or broken up, and when necessary the downward movement of the fuel and clinker over the grate-bars toward the bottom of the grate may be aided or facilitated.

As a further improvement in inclined grates having transverse flat grate-bars of the character described, we provide slots or perforations in the horizontal or main parts of the bars, as indicated at c^7 c^7 , Fig. 3. Such slots or perforations have the advantage of allowing a more direct passage of air to the mass of fuel resting on the grate, while increasing the durability of the grate-bar by facilitating the cooling of the same and of the clinker thereon, thereby preventing the overheating or burning of the bars and the adherence of the clinker thereto. The openings or perforations in the grate-bars are preferably arranged in the form of oblique slots, as shown in the drawings, Fig. 3. This arrangement of the perforation is preferred in order to facilitate the passage of the ashes from the fuel as the latter passes laterally over the grate-bars in

its downward movement and to prevent injury to the bars by highly-heated lumps or masses of partially-melted or semi-fluid clinker, which, if the slots were transverse to the bars, would be liable to move it downwardly into the slots, and thus become caught in the same, so as to stop the passage of air through the slots, and thus cause the burning of the bar. When the slots are obliquely arranged, this is much less likely to occur, because the masses of clinker are carried across the slots in their movement downwardly along the grate.

It is to be understood that while we have found the arrangement of the perforations in the form of oblique slots to be a desirable one, any other form or arrangement of the perforations is within the spirit of our invention.

We claim as our invention—

1. An inclined grate consisting of flat horizontally-arranged grate-bars having depending webs or flanges provided with longitudinal slots or openings, substantially as described.

2. An inclined grate provided with flat horizontal grate-bars arranged to overlap each other and provided with depending webs or flanges having slots or openings arranged opposite the spaces between the grate-bars, substantially as described.

3. An inclined grate consisting of flat horizontal grate-bars provided with depending webs or flanges having longitudinal slots or openings, said grate-bars being apertured or perforated, substantially as described.

In testimony that we claim the foregoing as our invention we affix our signatures in presence of two witnesses.

WILLIAM R. RONEY.
JOHN T. ARNOLD.

Witnesses:

C. CLARENCE POOLE,
GEORGE W. HIGGINS, Jr.